

CLAIMS

We claim:

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1. A method for controlling idle speed of an engine within a hybrid electric vehicle including a generator having a rotor assembly which is operatively coupled to the engine, said method comprising the steps of:

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determining whether a first set of vehicle idle entry conditions are met, wherein said first set of vehicle idle entry conditions comprises whether the vehicle is below a predetermined maximum idle speed and whether an accelerator is below a predetermined minimum pedal position;

scheduling a desired engine brake torque and selectively activating a vehicle system controller to control said generator and producing a first desired effect when a first set of operating conditions is present;

selectively activating an engine controller to control engine idle speed when a second set of operating conditions is present; and

turning off the engine when said first set of conditions is not present and when the engine has been in a current vehicle idle mode for a predetermined amount of time.

2. The method of claim 1, wherein the step of scheduling the desired engine brake torque and selectively activating the vehicle system controller to control said

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5 generator and producing the first desired effect when the first set of operating conditions is present comprises the step of scheduling the desired engine brake torque and selectively activating the vehicle system controller to control said generator to produce the first desired effect when a state of charge of a battery is below a predetermined battery minimum state of charge.

10 3. The method of claim 1, wherein the step of scheduling the desired engine brake torque and selectively activating the vehicle system controller to control said generator and producing the first desired effect when the first set of operating conditions is present comprises the step of scheduling the desired engine brake torque and selectively activating the vehicle system controller to control said generator to produce the first desired effect when a vacuum level in a climate control reservoir is below a predetermined minimum climate control vacuum level.

20 4. The method of claim 1, wherein the step of scheduling the desired engine brake torque and selectively activating the vehicle system controller to control said generator producing the first desired effect when the first set of operating conditions is present comprises the step of
25 scheduling the desired engine brake torque and selectively

activating the vehicle system controller to control said generator to produce the first desired effect when a vacuum level in a brake system reservoir is below a predetermined brake system vacuum level.

5. The method of claim 1, wherein the step of scheduling the desired engine brake torque and selectively activating the vehicle system controller to control said generator and producing the first desired effect when the first set of operating conditions is present comprises the step of scheduling the desired engine brake torque and selectively activating the vehicle system controller to control said generator to produce the first desired effect when a vapor canister contained within a fuel system requires purging.

6. The method of claim 1, wherein the step of scheduling the desired engine brake torque and selectively activating the vehicle system controller to control said generator producing the first desired effect when the first set of operating conditions is present comprises the step of scheduling the desired engine brake torque and selectively activating the vehicle system controller to control said generator to produce the first desired effect when an adaptive fuel table requires HEV-fast adaptive learning.

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7. The method of claim 1, wherein the step of scheduling the desired engine brake torque and selectively activating the vehicle system controller to control said generator and producing the first desired effect when the first set of operating conditions is present comprises the step of scheduling the desired engine brake torque and selectively activating the vehicle system controller to control said generator to produce the first desired effect when the engine has cooled below a predetermined engine temperature.

8. The method of claim 1, wherein the step of scheduling the desired engine brake torque and selectively activating the vehicle system controller to control said generator and producing the first desired effect when the first set of operating conditions is present comprises the step of scheduling the desired engine brake torque and selectively activating the vehicle system controller to control said generator to produce the first desired effect when a catalyst has cooled below a predetermined minimum catalyst temperature.

9. The method of claim 1, wherein the step of scheduling the desired engine brake torque and selectively

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activating the vehicle system controller to control said generator and producing the first desired effect when the first set of operating conditions is present comprises the step of scheduling the desired engine brake torque and selectively activating the vehicle system controller to control said generator to produce the first desired effect when air conditioning has been requested by a vehicle operator.

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10. The method of claim 1, wherein the step of selectively activating the engine controller to control engine idle speed when the second set of operating conditions is present comprises the step of selectively activating the engine controller to control engine idle speed when:

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the generator has failed; or

a battery state of charge exceeds a maximum desired level.

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11. A hybrid electric vehicle including a generator having a rotor assembly which is operatively coupled to an engine, the hybrid electric vehicle comprising:

a vehicle system controller for controlling idle speed of the engine when a first set of operating conditions is present at a scheduled engine brake torque to produce a desired
25 result; and

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an engine controller for controlling the idle speed of the engine when a second set of operating conditions is present.

5 12. The hybrid electric vehicle of claim 11, wherein said first set of operating conditions is selected from a group consisting of a low battery state of charge, a low climate control vacuum level, a low brake system reservoir vacuum level, a high fuel tank vapor pressure requiring fuel
10 vapor canister purging, a condition where the fuel vapor canister is currently being purged, a minimum time reached since previously purging the vapor canister, a low engine temperature, a low catalyst temperature, an adaptive fuel table requiring HEV-fast adaptive learning, and an activated
15 air conditioning switch.

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20 13. The hybrid electric vehicle of claim 11, wherein said second set of operating conditions is selected from a group consisting of a high battery state of charge and a failed generator.

14. A method for controlling idle speed of an engine within a hybrid electric vehicle including a generator having a rotor assembly which is operatively coupled to the engine,
25 said method comprising the steps of:

5 determining whether a first set of vehicle idle entry conditions are met, wherein said first set of vehicle idle entry conditions comprises whether the vehicle is below a predetermined maximum idle speed and whether an accelerator is below a predetermined minimum pedal position;

10 scheduling a desired engine brake torque and selectively activating a vehicle system controller to control said generator and producing a first desired effect when a first set of operating conditions are: a low battery state of charge, a low climate control vacuum level, a low brake system reservoir vacuum level, a high fuel tank pressure, the existence of a minimum time period since a last vapor canister purging, the existence of current vapor canister purging, the existence of a learned adaptive fuel table for the current driving mode, a low engine temperature, a low catalyst temperature, and the state of activation of an air conditioning switch;

15 20 selectively activating an engine controller to control engine idle speed when a second set of operating conditions is present;

turning off the engine when said first set of operating conditions is not present and when the engine has been in a current vehicle idle mode for a predetermined amount of time, otherwise maintaining said current vehicle idle mode.

15. The method of claim 14, wherein the step of selectively activating the engine controller to control engine idle speed when the second set of operating conditions is present comprises the step of selectively activating the engine controller to control engine idle speed when the generator has failed.

16. The method of claim 14, wherein the step of selectively activating the engine controller to control engine idle speed when the second set of operating conditions is present comprises the step of selectively activating the engine controller to control engine idle speed when a battery state of charge exceeds a maximum desired level.